WATER INFRASTRUCTURE INVESTMENT
PUBLIC UTILITIES BOARD (PUB)

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Addressing Economic Efficiency through Water Infrastructure Investment

1. Long-term planning and management of infrastructure projects
   I. System level advanced planning and development

2. Design for multi-use purposes
   I. Active, Beautiful, Clean Waters Programme (ABC Waters)

3. Enhanced flexibility
   I. System integration

4. Value for money over full project lifecycle
   I. Public-Private-Partnership (PPP) projects
   II. Quality-based Procurement approach
Singapore’s Water Challenges

Geographically challenged:
• Small island City-State
• 710 sq km, highly urbanised with population of 5.3million
• Limited natural water resources, land mass and water bodies for storage
1. Long-term infrastructure planning: 4 National Taps
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1st TAP: Local Catchment
- Increased PUB’s water catchments
- Case study: Damming of Sungei Punggol to create Punggol reservoir

2nd TAP: Imported Water
- 1962 Water Agreement allows the import of 250mgd from Johor River up to 2061

3rd TAP: NEWater
- High-grade, recycled source of water introduced in 2003
- 4 NEWater Plants in operation, with the 5th under construction

4th TAP: Desalinated Water
- Introduced in 2005, with completion of the 1st Desal DBOO Plant (30mgd)
- 2nd Plant (70mgd) at Tuas
2. Design for multi-use: (I) Active, Beautiful, Clean Waters Programme

- Strategic long-term initiative to improve Singapore’s quality of life
- Aims to create beautiful and clean streams, rivers, and lakes with community spaces for all to enjoy
- Turning Singapore into a ‘City of Gardens and Water’
2. Design for multi-use purposes

Case study: Marina Reservoir

- Marina Reservoir, located in the heart of the city, serves as a new lifestyle attraction and enhances the city’s vibrancy
- Ideal for recreational activities such as windsurfing, kayaking and dragon-boating, etc
- Hosted international water sporting events such as the 2015 SEA games, 2010 Youth Olympic games, etc.
3. Enhanced flexibility: (I) System integration

- Deep Tunnel Sewerage System (DTSS)
  - Compact design and efficient land use: Replaces 3 water reclamation plants and pumping stations, freeing up to 135 ha of land
  - Robust and reliable system: Deep tunnel sewers work by gravity
  - Environmental sustainability: Allowing every drop of used water to be collected and treated
3. Enhanced flexibility: (I) System integration

- Co-location of Tuas Water Reclamation Plant (TWRP) and Integrated Waste Management Facility (IWMF)

- TWRP receives & treats used water; producing biogas, sludge & water
- IWMF receives & treats municipal solid waste, food waste, NRP recyclables & dewatered sludge, producing electricity, heat, ash, used water & recyclables.
- Co-location as a “single entity”:
  - Process Synergies (by-product of one facility as resource for another)
  - Physical Synergies (e.g. common admin & operations building, roads)
4. Value for money: (I) Public-Private Partnership (PPP) approach

- PUB started adopting the PPP approach in 2003, to allow greater private sector participation to Design, Build, Own and Operate desalination and NEWater plants.

**Benefits of PPP approach:**

- Improved economic optimization: Strong incentive for private concession company that designs and builds the plant to also optimize the operation and maintenance costs of the facility.
- Economies of scale: Leverage on private sector’s wider scale of operation.
- Performance-based specifications: Flexibility for concession company to innovate and optimize the plant design through R&D.
- Strengthen private sector’s capabilities in the water delivery chain.
4. Value for money: (II) Quality-based Procurement approach

- Tender evaluation in PUB places emphasis on “Quality” aspects of the bid proposals
  - Price-Quality Method for Construction-Related Tenders
  - Quality-Fee Method (QFM) for Consultancy Services
- Total life-cycle cost (TLCC) assessment in evaluating bid proposals
- Case study: Tender for Process upgrading works at PUB waterworks
  - Composite Scoring method in tender evaluation - Price (70%): Quality (30%)
  - In the Price component, scoring was based on the net present value (NPV) of the TLCC for each proposal, which includes the computation of initial CAPEX and recurring OPEX costs
  - In the Quality component, scoring was based on performance and track records of projects, financial health and technical proposal
Conclusion

- Due to the lack of natural water resources in Singapore, quality infrastructure investment is crucial in ensuring a reliable, efficient and sustainable water supply for Singaporeans.

- PUB has invested greatly in quality infrastructure over the years, in line with PUB’s mission to ensure an efficient, adequate and sustainable supply of water for all.

- PUB will continue its efforts in investing in quality water infrastructure in the future.
Thank You